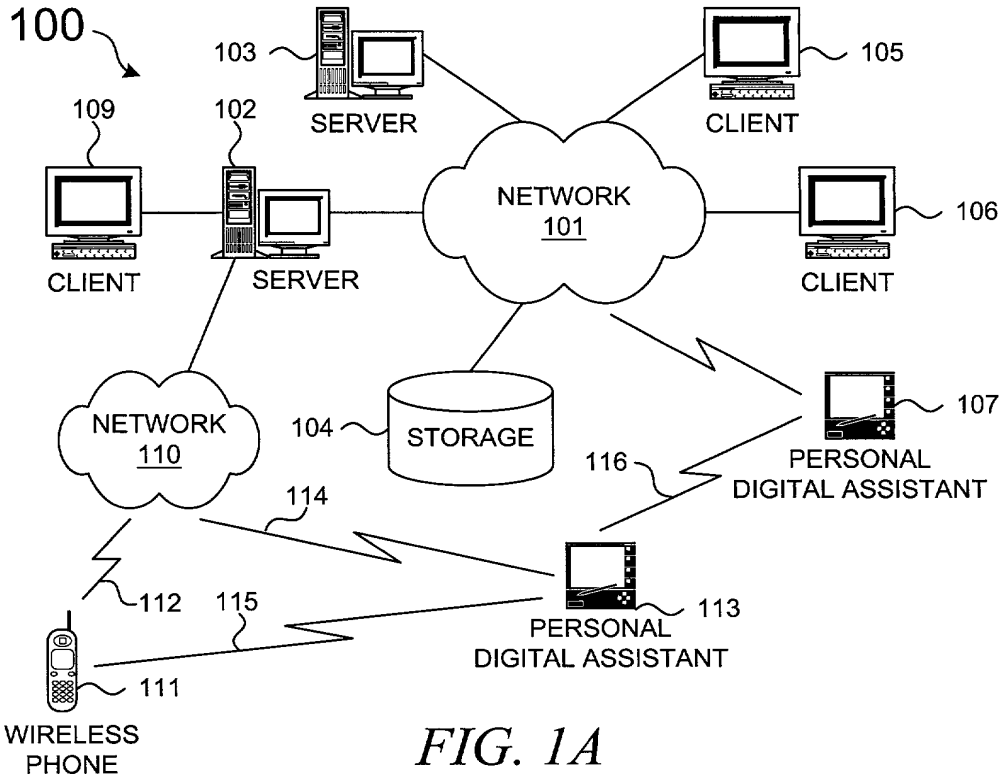

FIG. 1A
(PRIOR ART)

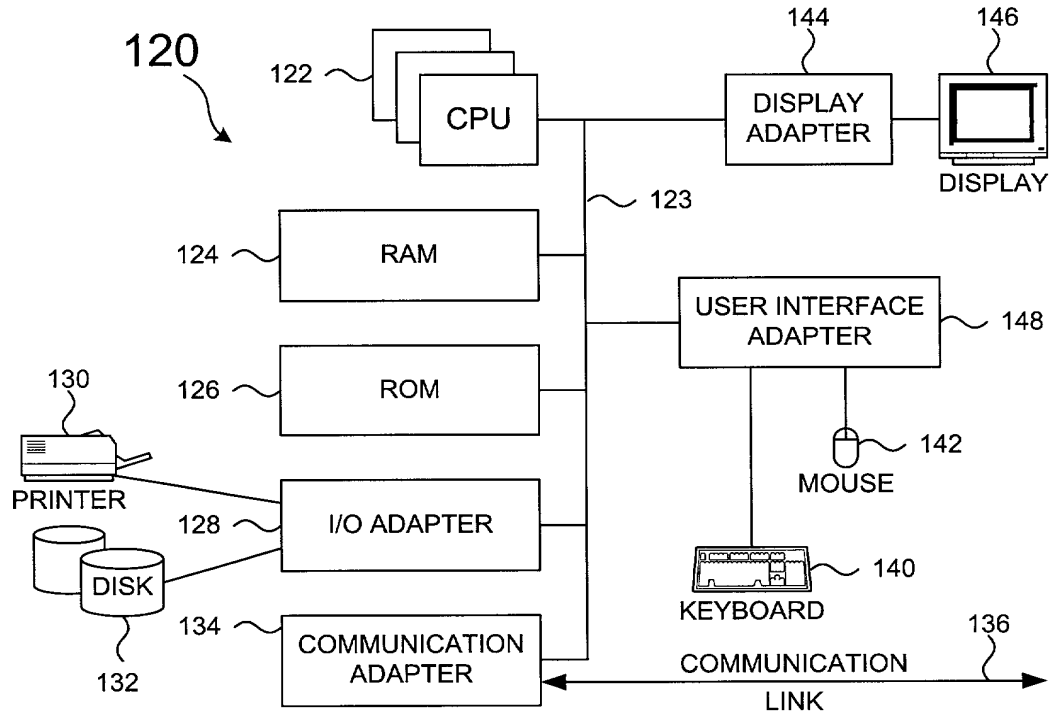

FIG. 1B
(PRIOR ART)

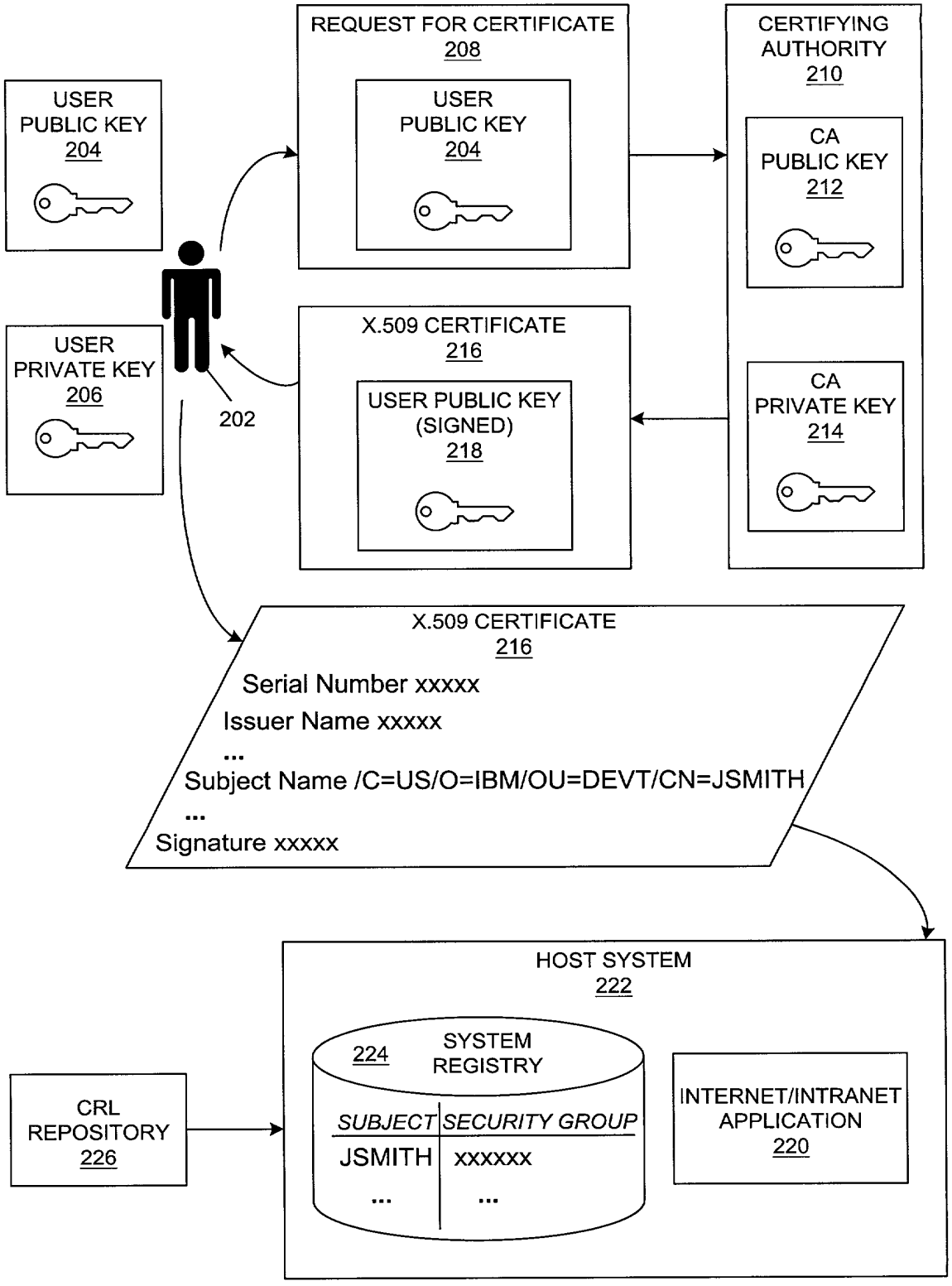

FIG. 2
(PRIOR ART)

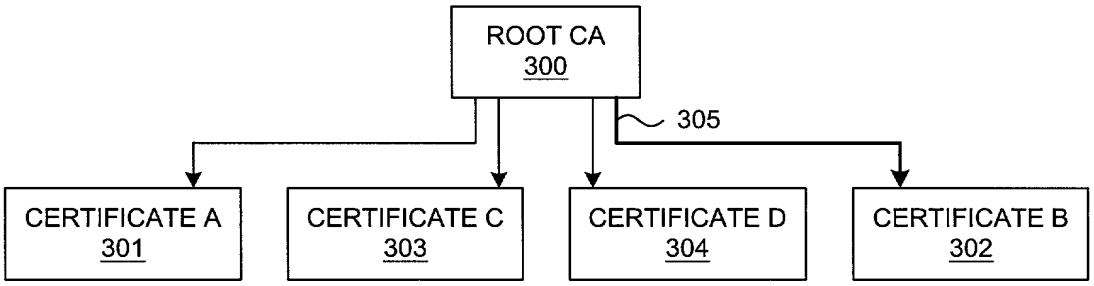
ROOT CA
300
305
CERTIFICATE A
301
CERTIFICATE C
303
CERTIFICATE D
304
CERTIFICATE B
302

FIG. 3A

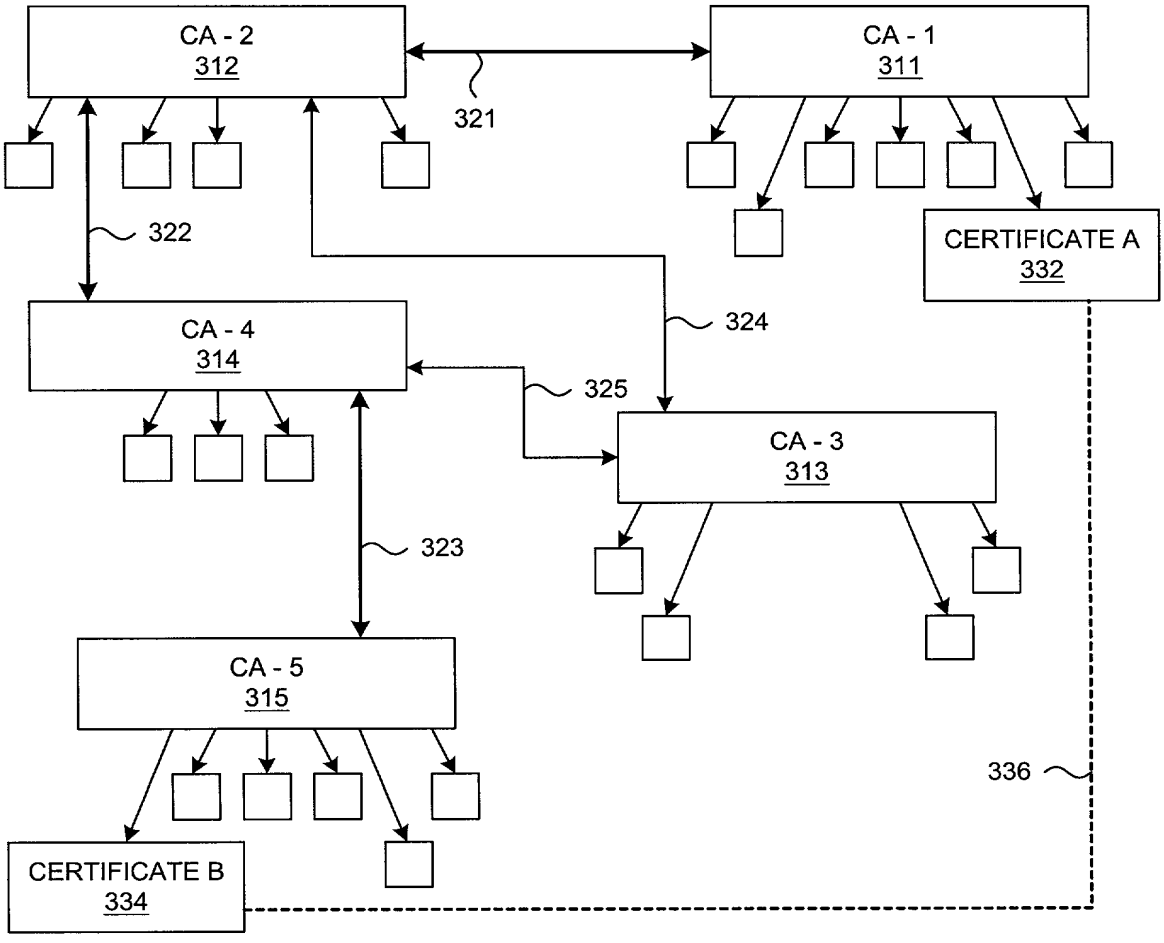
CA - 2
312
321
CA - 1
311
322
CERTIFICATE A
332
324
CA - 4
314
325
CA - 3
313
323
CA - 5
315
336
CERTIFICATE B
334

FIG. 3B

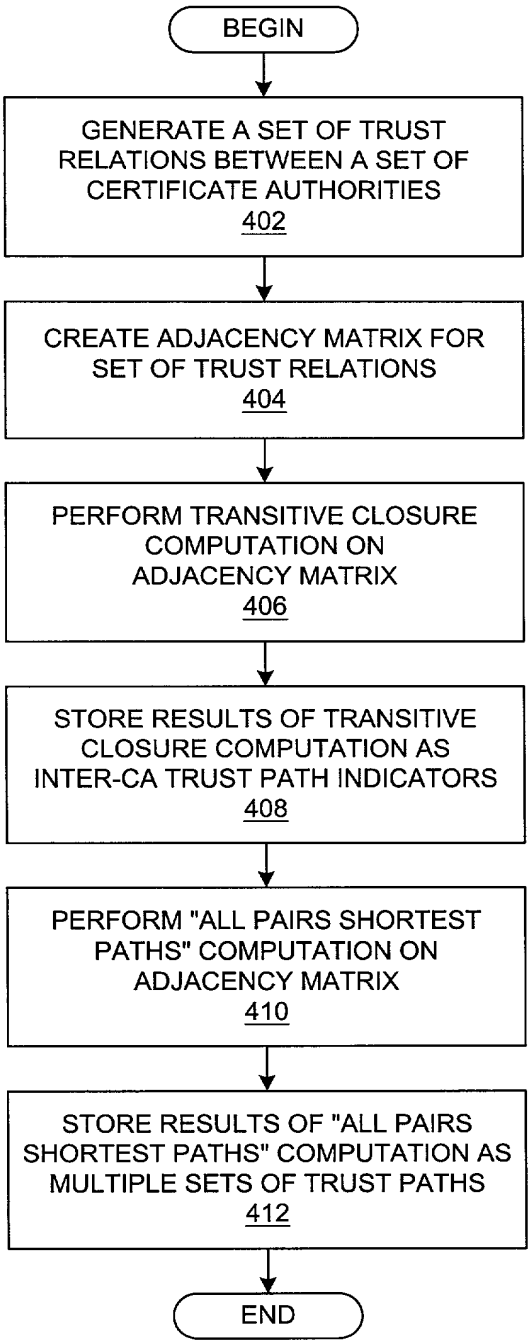

FIG. 4

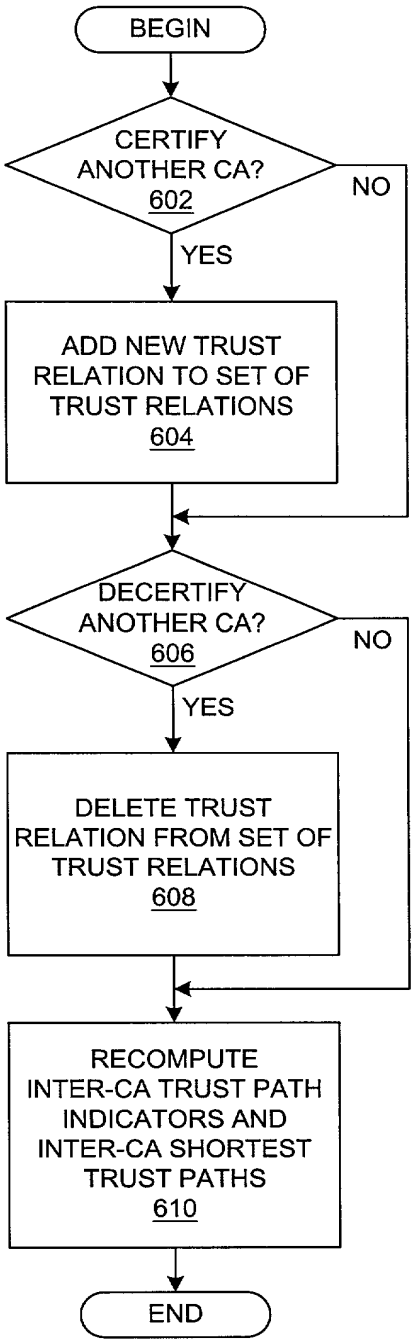

FIG. 6

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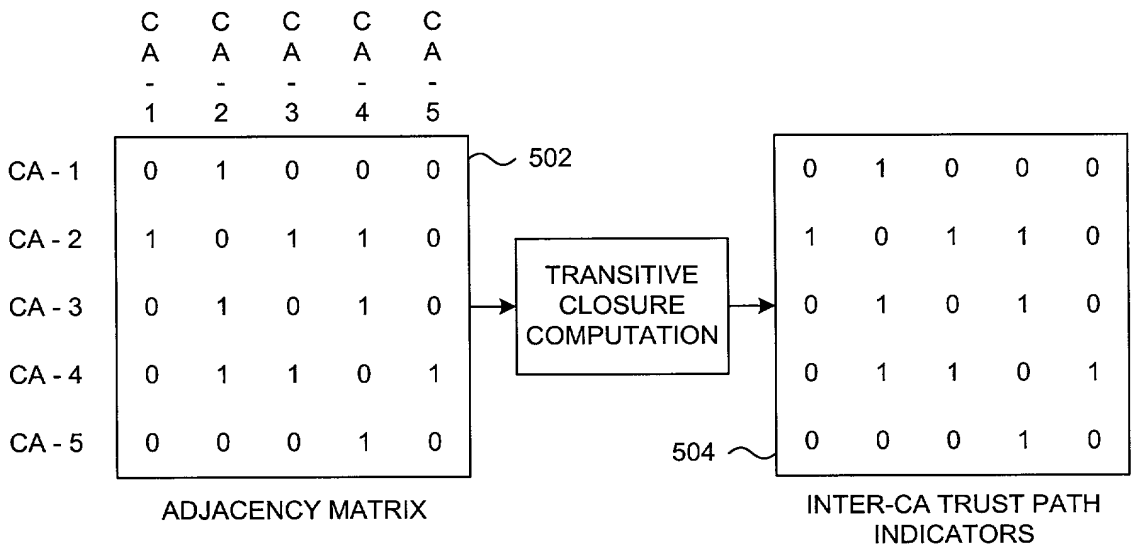
CA-1
CA-2
CA-3
CA-4
CA-5
0 1 0 0 0
1 0 1 1 0
0 1 0 1 0
0 1 1 0 1
0 0 0 1 0
502
TRANSITIVE CLOSURE COMPUTATION
504
0 1 0 0 0
1 0 1 1 0
0 1 0 1 0
0 1 1 0 1
0 0 0 1 0
ADJACENCY MATRIX
INTER-CA TRUST PATH INDICATORS

FIG. 5A

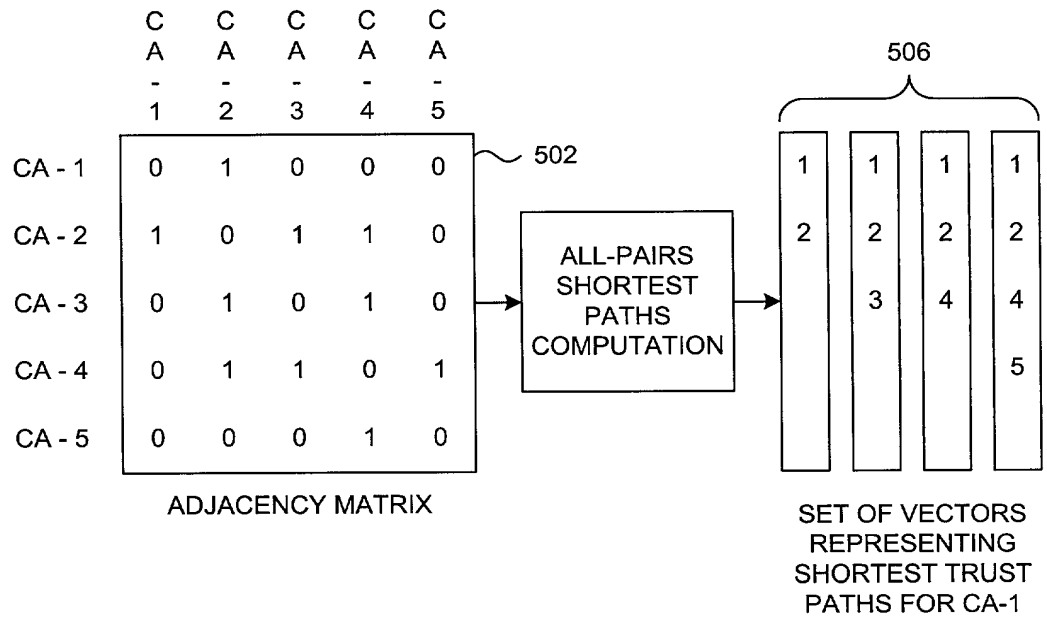
CA-1
CA-2
CA-3
CA-4
CA-5
0 1 0 0 0
1 0 1 1 0
0 1 0 1 0
0 1 1 0 1
0 0 0 1 0
502
ALL-PAIRS SHORTEST PATHS COMPUTATION
506
1 2
1 2 3
1 2 4
1 2 4 5
ADJACENCY MATRIX
SET OF VECTORS REPRESENTING SHORTEST TRUST PATHS FOR CA-1

FIG. 5B

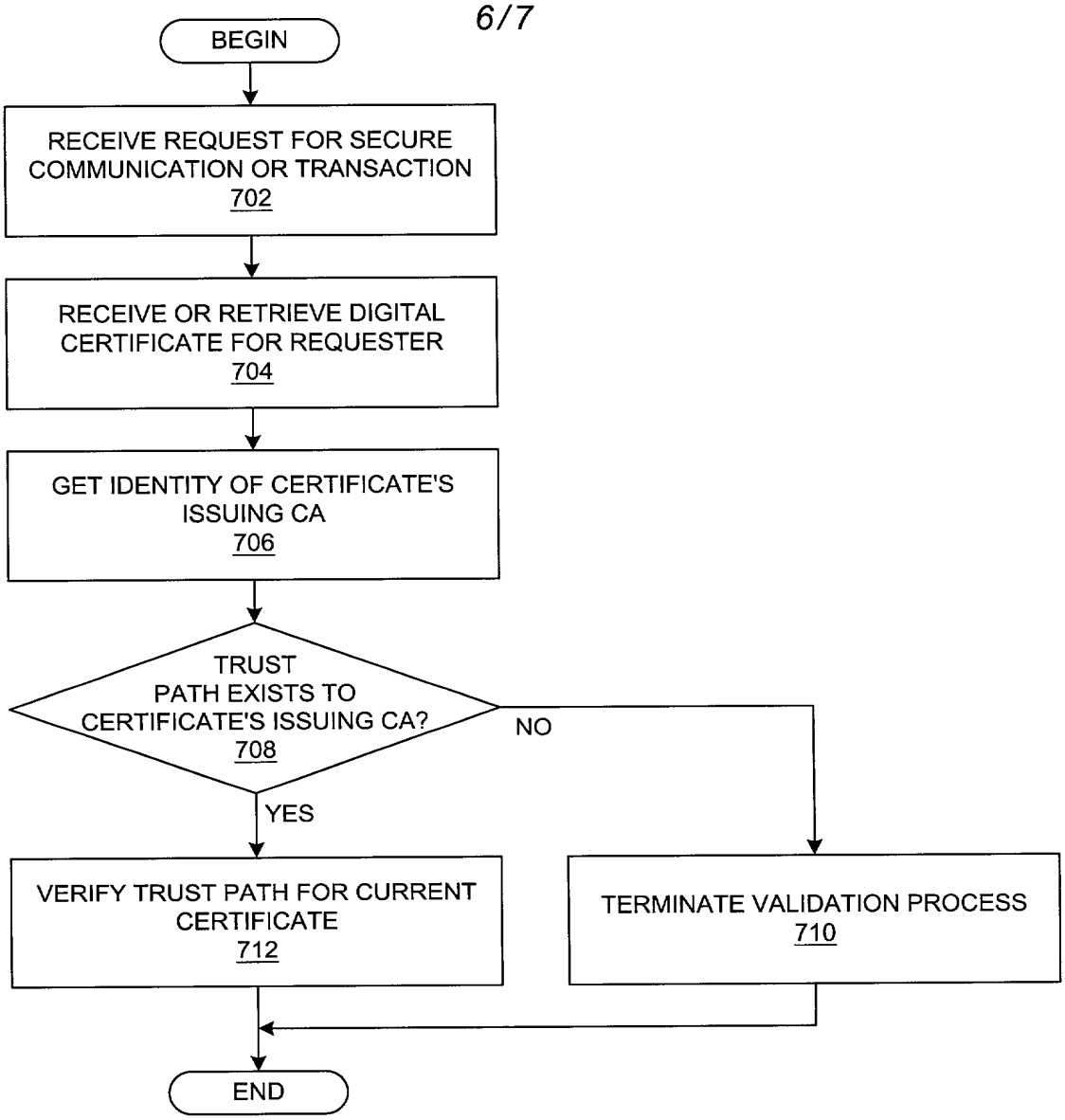
BEGIN
RECEIVE REQUEST FOR SECURE COMMUNICATION OR TRANSACTION
702
RECEIVE OR RETRIEVE DIGITAL CERTIFICATE FOR REQUESTER
704
GET IDENTITY OF CERTIFICATE'S ISSUING CA
706
TRUST PATH EXISTS TO CERTIFICATE'S ISSUING CA?
708
NO
YES
VERIFY TRUST PATH FOR CURRENT CERTIFICATE
712
TERMINATE VALIDATION PROCESS
710
END

FIG. 7

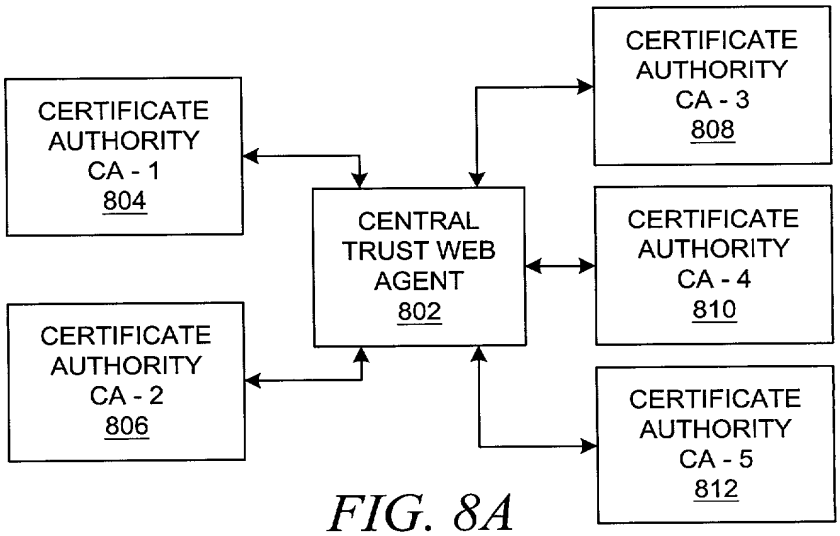
CERTIFICATE AUTHORITY CA - 1
804
CERTIFICATE AUTHORITY CA - 2
806
CENTRAL TRUST WEB AGENT
802
CERTIFICATE AUTHORITY CA - 3
808
CERTIFICATE AUTHORITY CA - 4
810
CERTIFICATE AUTHORITY CA - 5
812

FIG. 8A

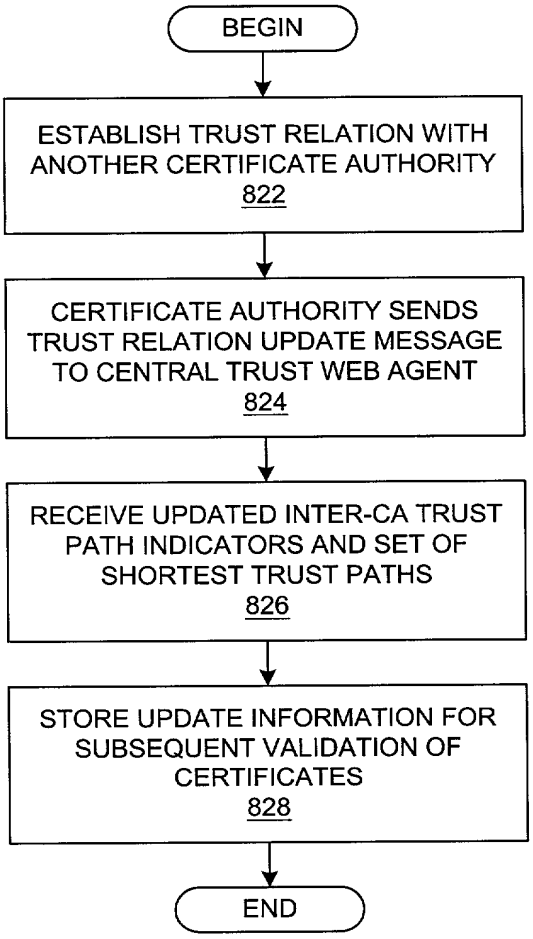
BEGIN
ESTABLISH TRUST RELATION WITH ANOTHER CERTIFICATE AUTHORITY
822
CERTIFICATE AUTHORITY SENDS TRUST RELATION UPDATE MESSAGE TO CENTRAL TRUST WEB AGENT
824
RECEIVE UPDATED INTER-CA TRUST PATH INDICATORS AND SET OF SHORTEST TRUST PATHS
826
STORE UPDATE INFORMATION FOR SUBSEQUENT VALIDATION OF CERTIFICATES
828
END

FIG. 8B

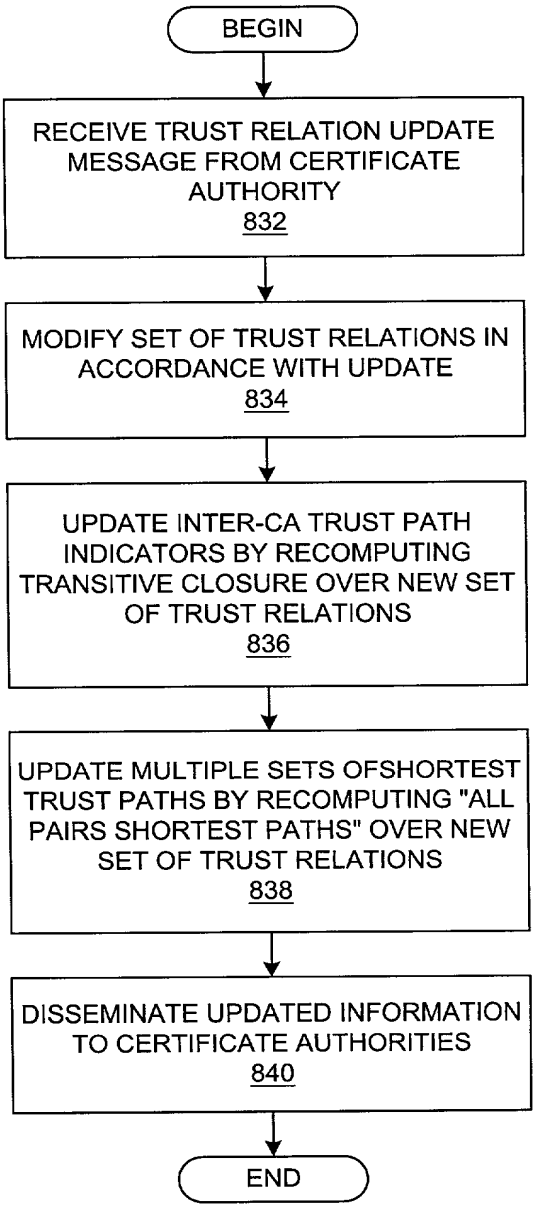
BEGIN
RECEIVE TRUST RELATION UPDATE MESSAGE FROM CERTIFICATE AUTHORITY
832
MODIFY SET OF TRUST RELATIONS IN ACCORDANCE WITH UPDATE
834
UPDATE INTER-CA TRUST PATH INDICATORS BY RECOMPUTING TRANSITIVE CLOSURE OVER NEW SET OF TRUST RELATIONS
836
UPDATE MULTIPLE SETS OFSHORTEST TRUST PATHS BY RECOMPUTING "ALL PAIRS SHORTEST PATHS" OVER NEW SET OF TRUST RELATIONS
838
DISSEMINATE UPDATED INFORMATION TO CERTIFICATE AUTHORITIES
840
END

FIG. 8C